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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|---------------------------------|
| 10/770,471 | 02/04/2004 | Sang-min Shin | 249/403 | 1363 |
| 7590 | 06/29/2005 | | | |
| LEE & STERBA, P. C. 1101 Wilson Boulevard, Suite 2000 Arlington, VA 22209 | | | | EXAMINER ECKERT II, GEORGE C |
| | | | | ART UNIT 2815 |
| | | | | PAPER NUMBER |

DATE MAILED: 06/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|---------------------|--------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/770,471 | SHIN ET AL. |
| | Examiner | Art Unit |
| | George C. Eckert II | 2815 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 15 April 2005.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-25 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-25 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 04 February 2004 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

Election/Restrictions - Response to Amendment

1. Applicant's amendment, dated April 15, 2005, in response to the restriction requirement has canceled claims 26-47 and thus made the Group I / Group II restriction requirement moot. Moreover, applicant has amended the dependencies of claims 4 and 6 to make moot certain of the species restriction. Based on the amendments, the species restriction is withdrawn, claims 1-25 are pending and will be examined herein.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 4, 8, 10, 12, 16, 18, 20 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by 6,841,817 to Kurasawa et al. Kurasawa teaches in figure 10 a ferroelectric capacitor comprising:

a lower electrode 33, a dielectric layer 34 and an upper electrode layer 35, which are sequentially stacked;

wherein the dielectric layer has a multi-layer structure including a plurality of sequentially stacked ferroelectric films 34A-C, and wherein two adjacent ferroelectric films have

either different compositions or different composition ratios (Kurasawa teaches in column 6, lines 16-25 that the dielectric layer 34A-C may comprise PZT in different composition ratios and teaches in column 6, lines 47-49 that any of the layers 34A-C may comprise PLZT such that adjoining layers are formed of different compositions).

Regarding claims 4 and 12, Kurasawa teaches that the capacitor comprises three ferroelectric films 34A-C which are sequentially stacked (see fig. 10). Regarding claims 8, 10, 16 and 18, Kurasawa teaches that the ferroelectric films may be either PZT or PLZT and that the adjacent films have either different compositions or different composition ratios (see again column 6, lines 16-25 and lines 47-49). Regarding claims 20 and 21, Kurasawa teaches that the electrodes are single layer of metal which is platinum (col. 6, lines 3-4 and col. 7, line 28).

3. Claims 1-4, 6, 8-12, 14 and 16-25 are rejected under 35 U.S.C. 102(b) as being anticipated by 6,229,166 to Kim et al. Kim teaches in figure 1 a capacitor comprising:

a lower electrode 112, a dielectric layer D, and an upper electrode layer 120, which are sequentially stacked,

wherein the dielectric has a multi-layer structure including a plurality of sequentially stacked ferroelectric films 114, 116 and 118, and wherein two adjacent ferroelectric films have either different compositions or different composition ratios (see col. 4, lines 36-46 where Kim teaches that the layers 114 and 118 as seed layers are ferroelectric and may either be a different composition (e.g. PbTiO₃) or may be a different composition ratio (e.g. rich Pb content)).

Regarding claims 2, 3 and 20-25, Kim teaches that the electrodes may be Pt, Ir, IrO₂, RuO₂ or a stack of any of those (col. 6, lines 31-35).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 6, 7, 9, 11, 14, 15, 17, 19 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurasawa in view of 6,229,166 to Kim et al. As discussed above, Kurasawa teaches a ferroelectric capacitor having three stacked ferroelectric layers wherein adjacent layers are either different compositions or different composition ratios. Kurasawa also teaches that the electrodes are platinum and that the thickness of the first and third ferroelectric films is 20 nm (col. 6, lines 10-15). Kurasawa does not expressly teach the remaining claim limitations which are drawn to the thickness of the second ferroelectric layer (30 – 150 nm) and the composition of the electrodes (e.g. an interlayer of platinum between the electrodes and the dielectric layer).

Kim teaches a ferroelectric capacitor wherein the electrodes may be formed of be Pt, Ir, IrO₂, RuO₂ or a stack of any of those (col. 6, lines 31-35). Kurasawa and Kim are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form the device of Kurasawa having an additional layer of electrode material as taught by Kim. The motivation for doing so is that using the materials taught by Kim is merely a substitution of equivalents which are known for the same purpose. Regarding the specific thickness of the second ferroelectric layer, it is considered obvious as an optimization of that taught by Kurasawa to change the thickness from 180 nm to a

range of 30 – 150 nm, especially absent any showing by applicant that the claimed range produces an unexpected result. Therefore, it would have been obvious to combine Kurasawa and Kim to obtain the invention of claims 2, 3, 6, 7, 9, 11, 14, 15, 17, 19 and 22-25.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional references teach various ferroelectric capacitors having layers with different compositions or ratios.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Eckert II whose telephone number is (571) 272-1728.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



GEORGE ECKERT
PRIMARY EXAMINER